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APPLICANT: J. Pandel et al.

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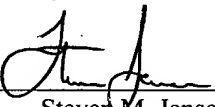
§371 DATE: July 9, 2001

EXAMINER: Y. Lee

FOR: METHOD AND ARRANGEMENT FOR MOTION ESTIMATION IN A
DIGITIZED PICTURE HAVING PIXELS

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By: 
Steven M. Jensen

Commissioner for Patents
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Sir:

AMENDMENT

Applicants are in receipt of the Office Action dated June 3, 2005 of the above-referenced application. Please amend the application as follows:

Amendments to the claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 5 of this paper.

Amendments to the claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of claims:

Claims 1-10 (canceled)

Claim 11 (currently amended): A method for motion estimation in a digitized image having pixels, comprising:

grouping pixels in picture blocks,

in which the pixels are grouped to form at least one first picture area and one second picture area;

wherein first motion estimation is carried out in a first search area for at least one first picture block in the first picture area to determine a first motion vector whereby movement of the first picture block is described in comparison to the first picture block in a preceding picture and/or in comparison to the first picture block in a subsequent picture;

wherein second motion estimation is carried out in a second search area for at least one second picture block in the second search area to determine a second motion vector whereby movement of the second picture block is described in comparison to the second picture block in a preceding picture and/or in comparison to the second picture block in a subsequent picture;

wherein the first search area and the second search area are of different sizes; and

wherein the size of the first search area and/or of the second search area is varied as a function of a predetermined picture quality ~~according to which the first picture block and/or the second picture block are/is coded~~ measured by quantization parameter such that if the picture ~~quality~~ quantization parameter of the first picture block is ~~higher~~ smaller than the picture ~~quality~~ quantization parameter of the second picture block, then the size of the first search area is larger than the size of the second search area, whereas if the ~~picture quality~~ quantization parameter of the first picture block is ~~lower~~ larger than the ~~picture quality~~ quantization parameter

of the second picture block, then the size of the first search area is smaller than the size of the second search area, such that a higher quantization parameter indicates a lower picture quality.

Claim 12 (canceled)

Claim 13 (previously presented): The method of claim 11 used for coding the digitized image.

Claim 14 (original): The method of claim 13 wherein variable length coding of the motion vectors is carried out; and a number of stored, different tables, in which codes for variable length coding are stored, are used for variable length coding.

Claim 15 (original): The method of claim 14 wherein the tables are matched to the maximum length of the motion vectors.

Claim 16 (currently amended): An arrangement for motion estimation in a digitized image having pixels, comprising:

a processor which is set up such that the following steps can be carried out:

the pixels are grouped in picture blocks;

the pixels are grouped to form at least one first picture area and one second picture area;

first motion estimation is carried out in a first search area for at least one first picture block in the first picture area to determine a first motion vector whereby movement of the first picture block is described in comparison to the first picture block in a preceding picture and/or in comparison to the first picture block in a subsequent picture;

second motion estimation is carried out in a second search area for at least one second picture block in the second search area to determine a second motion vector whereby movement of the second picture block is described in comparison to the second picture block in a preceding picture and/or in comparison to the second picture block in a subsequent picture;

in which the first search area and the second search area are of different sizes; and

in which the size of the first search area and/or of the second search area is varied as a function of a predetermined picture quality ~~according to which the first picture block and/or the~~

~~second picture block are/is coded~~ measured by quantization parameter such that if the ~~picture quality~~ quantization parameter of the first picture block is ~~higher~~ smaller than the ~~picture quality~~ quantization parameter of the second picture block, then the size of the first search area is larger than the size of the second search area, whereas if the ~~picture quality~~ quantization parameter of the first picture block is ~~lower~~ larger than the ~~picture quality~~ quantization parameter of the second picture block, then the size of the first search area is smaller than the size of the second search area, such that a higher quantization parameter indicates a lower picture quality.

Claim 17 (canceled)

Claim 18 (original): The arrangement of claim 16 used in a picture coding device.

Claim 19 (original): The arrangement of claim 16, used in a picture coding device,
wherein the processor is set up such that, variable length coding of the motion vectors is carried out; and a number of stored, different tables, in which codes for variable length coding are stored, are used for variable length coding.

Claim 20 (original): The arrangement of claim 19 wherein the processor is set up such that the tables are matched to the maximum length of the motion vectors.

REMARKS

Claims 11, 13-16, and 18-20 are pending in the application. Claims 11 and 16 have been amended by the present amendment to incorporate subject matter from claims 12 and 17, which have been canceled without prejudice, and additional subject matter from the specification to define "picture quality" in terms of quantization parameter (see specification at pages 11-12).

Applicants appreciate the courtesy extended by Examiner Lee in conducting a telephone interview with Applicants' representative on June 21, 2005. During the telephone interview, Applicants' representative explained differences between the claimed invention and the O'Connell reference. The Examiner recommended that "picture quality" be further defined in the claims.

As amended, claims 11 and 16 define "picture quality" as a function of the quantization parameter (see specification at pages 11-12).

Applicants' claimed invention is directed to a method and an arrangement for motion estimation in a digitized image having pixels. As recited in claims 11 and 16, the sizes of first and second search areas are varied as a function of picture quality measured by **quantization parameter**. The quantization parameter is a measurement of "the quantization steps which were used to code the preceding picture" (see specification at page 11, lines 15-16). The size (S) of a search area is directly related to quantization parameter (QP) according to the following equation: $S = 15 - (QP/2)$. In other words, the size S of the search area for a picture block becomes larger as the quantization parameter is smaller, which corresponds to high picture quality (see page 11, lines 32-34).

Claims 11-20 were rejected under 35 USC 102(b) as being anticipated by U.S. Patent 5,537,155 to O'Connell et al. (hereinafter "O'Connell"). This rejection is respectfully traversed.

Applicants' remarks in the Amendment filed on May 16, 2005 are incorporated by reference herein.

O'Connell does not teach or suggest a method or arrangement for motion estimation in which the sizes of first and second search areas are varied as a function of picture quality measured by quantization parameter such that if the quantization parameter of the first picture block is **smaller** than the quantization parameter of the second picture block, then the size of the first search area is **larger** than the size of the second search area, whereas if the quantization parameter of the first picture block is **larger** than the quantization parameter of the second picture block, then the size of the first search area is **smaller** than the size of the second search area.

In O'Connell, reference numerals 400 to 404 (cited as corresponding to the first and second search areas) actually refer to displacement patterns of different densities. For example, as indicated in column 5, lines 17-20, the first search point displacement pattern 400 "should be very dense," whereas the second search point displacement pattern 401 "should be moderately dense" (column 5, lines 23-27). These displacement patterns are used for comparing video blocks of a current video frame with video blocks of a previously stored video frame.

In contrast, the Applicants' claimed invention requires the sizes of first and second search areas to be varied as a function of **quantization parameter**.

In O'Connell, there is no teaching or suggestion of the use of **quantization parameter** to measure picture quality, nor any connection between the size of any search area and the **quantization parameter** of the respective picture block in such a search area. Therefore, even if the displacement patterns of O'Connell are considered "search areas," O'Connell does not teach or suggest any variation in the sizes of these displacement patterns as a function of **quantization parameter**.

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'Peter F. Corless', written over a horizontal line.

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